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10/634,056

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Rudolf M. Smaling

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BARNES & THORNBURG LLP  
11 SOUTH MERIDIAN  
INDIANAPOLIS, IN 46204

EXAMINER

MERKLING, MATTHEW J

ART UNIT

PAPER NUMBER

1795

MAIL DATE

DELIVERY MODE

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

|                              |  |   |  |
|------------------------------|--|---|--|
| <b>Office Action Summary</b> | <b>Application No.</b><br>10/634,056   | <b>Applicant(s)</b><br>SMALING, RUDOLF M. |  |
|                              | <b>Examiner</b><br>MATTHEW J. MERKLING | <b>Art Unit</b><br>1795                   |  |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 22 April 2008.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-18 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-18 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                     | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

## DETAILED ACTION

### *Claim Rejections - 35 USC § 102*

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-7 and 16-18 are rejected under 35 U.S.C. 102(b) as being anticipated by Noguchi et al. (US 4,143,620).

Regarding claim 1, Noguchi discloses a method of operating a fuel reformer ( (110, see abstract), comprising the steps of:

determining the temperature of a reformat gas (see col. 8 lines 29-45 where the reforming reactor temperature is detected, which corresponds to the outlet temperature of the reformat gas) produced by the fuel reformer, and

adjusting an air-to-fuel ratio of an air/fuel mixture processed by the fuel reformer based on the temperature of the reformat gas (see col. 8 lines 29-45 where the air-fuel ratio is adjusted based on the temperature of the reforming reactor/reformat gas).

Regarding claim 2, Noguchi, as discussed in claim 1 above, further discloses the fuel reformer (110) has an air inlet valve (220) associated therewith, and

the adjusting step comprises adjusting position of the air inlet valve based on the temperature of the reformat gas (col. 5 lines 22-28).

Regarding claims 3-6, Noguchi, as discussed in claim 1 above, further discloses a step of comparing the temperature of the reformat gas/reforming reactor to a predetermined temperature value (col. 7 lines 33-44), and

the adjusting step comprises reducing the air-to-fuel ratio of the air/fuel mixture if the temperature of the reformat gas is greater than the predetermined temperature value (at low temperatures, the valve 220 is opened to increase the air flow and the air/fuel ratio and when the temperature is high, valve 220 closes to decrease the air flow and the air/fuel ratio, col. 5 lines 30-43 and col. 5 line 66- col. 6 line 8).

Regarding claim 7, Noguchi, as discussed in claim 1 above, further discloses sensing the temperature of the reformat gas/reforming reactor with a temperature sensor (thermocouple, col. 6 line 65 – col. 7 line 3).

Regarding claim 16, Noguchi discloses a method of operating a fuel reformer, the method comprising the steps of:

operating the fuel reformer so as to process an air/fuel mixture having a first air-to-fuel ratio during a first period of time (such as during cold-starting, see col. 5 lines 30-35),

determining the temperature of a reformat gas produced by the fuel reformer during the first period of time (see col. 5 lines 30-35), and

operating the fuel reformer so as to process an air/fuel mixture having a second air-to-fuel ratio during a second period of time (such as after startup) based on the temperature of the reformat gas, the air/fuel mixture having the second air-to-fuel ratio being

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different than the air/fuel mixture having the first air-to-fuel ratio (col. 5 line 66 – col. 6 line 8).

Regarding claim 17, Noguchi, as discussed in claim 16 above, further discloses the fuel reformer has an air inlet valve (220) associated therewith, the step of operating the fuel reformer so as to process the first air/fuel mixture having a first air-to-fuel ratio comprises positioning the air inlet valve at a first valve position (col. 5 lines 30-43), and the step of operating the fuel reformer so as to process the second air/fuel mixture having the second air-to-fuel ratio comprises positioning the air inlet valve at a second valve position, the second valve position being different than the first valve position (col. 5 line 66 – col. 6 line 8).

Regarding claim 18, Noguchi, as discussed in claim 16 above, further discloses the determining step comprises sensing the temperature of the reformat gas with a temperature sensor (thermocouple, col. 6 line 65 – col. 7 line 3).

### ***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

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1. Determining the scope and contents of the prior art.
  2. Ascertaining the differences between the prior art and the claims at issue.
  3. Resolving the level of ordinary skill in the pertinent art.
  4. Considering objective evidence present in the application indicating obviousness or nonobviousness.
5. Claims 8-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Noguchi et al. (US 4,143,620).

Regarding claim 8, Noguchi discloses a fuel reforming assembly (110, see abstract), comprising:

a fuel reformer (110),  
a temperature sensor (thermocouple, col. 6 line 65 – col. 7 line 3),  
a controller (controlling circuit, 230) electrically coupled to both the fuel reformer and the temperature sensor (col. 6 line 65 – col. 7 line 3), wherein the controller comprises a memory device (it stores a reference signal, col. 7 lines 3-9) where the controller is designed to:

(a) monitor output from the temperature sensor so as to determine the temperature of a reformat gas produced by the fuel reformer, and

(b) adjust an air-to-fuel ratio of an air/fuel mixture processed by the fuel reformer based on the temperature of the reformat gas (col. 7 lines 3-22).

While Noguchi discloses a controlling means to control the valve position of the air intake valve, Noguchi, does not explicitly disclose the use of a processor in the controller. However, judging from the issue date of Noguchi, microprocessor technology was in its infancy. As such, it would have been obvious to one of ordinary skill in the art at the

time of the invention to replace the electromagnetic coil controlling means of Noguchi, with a controller containing a processor.

Regarding claim 9, modified Noguchi, as discussed in claim 8 above, further discloses an electrically-controlled air inlet valve (220), wherein:

the air inlet valve is electrically coupled to the processor, and the plurality of instructions, when executed by the processor, further cause the processor to adjust position of the air inlet valve based on the temperature of the reformat gas (see col. 6 line 65 – col. 7 line 44).

Regarding claims 10-13, modified Noguchi, as discussed in claim 8 above, further discloses the air inlet valve (220) is electrically coupled to the processor (col. 7 lines 3-21), and the plurality of instructions, when executed by the processor, further cause the processor to:

(a) compare the temperature of the reformat gas to a predetermined temperature value (col. 7 lines 3-9), and

(b) reduce the air-to-fuel ratio of the air/fuel mixture if the temperature of the reformat gas is greater than the predetermined temperature value increase the air/fuel ratio if the temperature of the reformat gas is less than the predetermined temperature value (col. 5 lines 30-43 and col. 5 line 66 – col. 6 line 9).

Regarding claim 14, modified Noguchi, as discussed in claim 8 above, further discloses the fuel reformer comprises a reactor housing (110, see Fig. 1A), and the temperature sensor (184) is positioned in the reactor housing (see Fig. 1A).

Regarding claim 15 Noguchi, as discussed in claim 8 above, further discloses the fuel reformer comprises a reactor housing (110, see Fig. 1A). Noguchi, as discussed in claim 8 above, teaches a temperature sensor (184) to detect the temperature of the reforming reactor, but fails to explicitly disclose the temperature sensor located outside the reactor housing. However such modification (such as placing the temperature sensor on the outlet line (112) of the reformer) is a mere rearrangement of the system parts that would not modify the operation of the system (operation would remain the same as the outlet temperature of the reforming reactor is substantially equal to the interior temperature of the reforming reactor), and would have been obvious to one of ordinary skill in the art at the time of the invention. See In re Japikse, 181 F.2d 1019, 86 USPQ 70 (CCPA 1950).

### ***Response to Arguments***

6. Applicant's arguments filed 4/22/08 have been fully considered but they are not persuasive.

On page 2, Applicant argues that Noguchi does not teach the claimed limitation "determining the temperature of a reformat gas produced by the fuel cell". Specifically, Applicant argues that the examiner's assertion that the temperature of the reformer corresponds to the temperature of the reformat is inaccurate. The examiner respectfully disagrees. As one of ordinary skill in the art would recognize, the temperature of the reforming reactor would indeed correspond to the temperature of the effluent gas from said reformer. With variations in the temperature of the reformer, and inherently with the temperature of the reformat, Noguchi teaches adjusting the air-fuel ratio, as claimed.

Regarding the passages of Noguchi that Applicant cites in argument that Noguchi does teach this limitation, Applicant argues that the temperature of the Noguchi reactor vessel is indicative of the temperature of the exhaust gas produced by the engine and not the reformat gas produced by the reformer. The examiner notes that regardless of why the reformer vessel changes temperature, the reformat will follow that trend and the air/fuel ratio will be adjusted based on that reformer/reformat temperature.

### ***Conclusion***

7. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MATTHEW J. MERKLING whose telephone number is (571)272-9813. The examiner can normally be reached on M-F 8:30-4:30.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Alexa Neckel can be reached on (571) 272-1446. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/M. J. M./  
Examiner, Art Unit 1795

/Alexa D. Neckel/  
Supervisory Patent Examiner, Art Unit 1795